conduction modules **287**. Array of contacts **341** and **325** and array of electrodes **335** may be two dimensional. Contacts **341** and **325** and electrodes **335** may have a predetermined diameter, respectively, and have a uniform center-to-center spacing. Clamping mechanism **345** holds with an applied force i.e. with springs, foam, or polymeric material **348**, apparatus **284** including thermal conduction module **287** against array of electrodes **335** on interface pellicle **31** which in turn are against array of contacts **325**. Contacts **325** may be supported and interconnected by metalization on a printed circuit board **359**. Clamping mechanism **346** holds with an applied force an apparatus similar to apparatus **284**, not shown, against an array of electrodes similar to electrodes **335** on an interface pellicle, not shown, inside clamping mechanism **346**. Printed circuit board **359** may have contacts or a connector thereon for making interconnections. Clamping mechanisms **345** and **346** may be spaced part in an array of clamping mechanisms.

In FIGS. **2-29**, like references are used for functions corresponding to the apparatus of the preceeding or earlier Figure.

Having thus described our invention, what we claim as new and desire to secure by Letters Patents is:

1. An apparatus for providing electrical contact between an array of first contacts forming a first rigid probe adapted to transfer force and a corresponding array of raised conductive bumps on an electrical device supported to withstand said force, said array of raised conductive bumps being substantially deformed under said transfer force, comprising:

a flexible membrane having an upper surface and a lower surface, and

an array of electrodes formed in said flexible membrane and extending above said upper surface and below said lower surface along respective longitudinal axes of said electrodes,

each said electrode having a first end extending above said upper surface and a second end extending below said lower surface and a first predetermined length along said respective longitudinal axis,

said first end of said electrode having a plurality of first raised portions for penetrating the surface of said conductive bump to create a plurality of non-contiguous sidewalls having a maximum predetermined depth,

said first end of said electrode having a second recessed portion adjacent and between said first raised portions to limit the penetration of any of said plurality of said first raised portions into the surface of said conductive bump,

said flexible membrane having a thickness to form at times a curved upper and lower surface having a minimum radius of curvature in localized regions and an elasticity to provide for a predetermined elastic deformation of said flexible membrane in localized regions to permit said electrodes to move independently.

2. The apparatus of claim **1** wherein said array of electrodes are spaced apart in a pattern having a center-to-center spacing of less than 0.381 mm (0.015 inches).

3. The apparatus of claim **1** wherein said flexible membrane has a thickness less than 0.127 mm (0.005 inches).

4. The apparatus of claim **1** wherein said flexible membrane has a thickness less than 0.0762 mm (0.003 inches).

5. The apparatus of claim **1** wherein said flexible membrane includes polyimide.

6. The apparatus of claim **1** wherein said flexible membrane includes polymeric material.

7. The apparatus of claim **1** wherein said array of electrodes includes at least 600 electrodes.

8. The apparatus of claim **1** wherein said second end of said electrode includes a rounded surface to enable said second end to rock against a contact having a flat surface.

9. The apparatus of claim **1** wherein said electrodes include a metal selected from the group consisting of copper and nickel.

10. The apparatus of claim **9** wherein said electrodes are formed by first electroplating copper through openings in said flexible membrane from a copper layer on one of said surfaces of said flexible membrane and second selectively etching said copper layer.

11. An apparatus for providing electrical contact between an array of first contacts forming a first rigid probe adapted to transfer force and a corresponding array of raised conductive bumps on an electrical device supported to withstand said force, said array of raised conductive bumps being substantially deformed under said transfer force, comprising:

a flexible membrane having an upper surface and a lower surface, and

an array of electrodes formed in said flexible membrane and extending above said upper surface and below said lower surface along respective longitudinal axes of said electrodes,

each said electrode having a first end extending above said upper surface and a second end extending below said lower surface and a first predetermined length along said respective longitudinal axis,

said first end of said electrode having one or more first raised portions thereon for penetrating the surface of said conductive bump at a force below 20 oz. to create sidewalls having a depth in said conductive bump,

said first end of said electrode having a second recessed portion positioned adjacent said one or more first raised portions to limit the penetration of said first raised portion into the surface of said conductive bump,

said flexible membrane having a thickness to form at times a curved upper and lower surface having a minimum radius of curvature in localized regions and an elasticity to provide for a predetermined elastic deformation of said flexible membrane in localized regions to permit said electrodes to move independently.

12. The apparatus of claim **11** wherein said second end of said electrode includes a rounded surface to enable said second end to rock against a contact having a flat surface.

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